

## **DETAILED ACTION**

### ***Response to Amendment***

In response to the amendment received December 29, 2009:

- a. Claims 1-16 are pending;
- b. Claims 8-16 have been withdrawn;
- c. Claims 1-7 have been amended;
- d. The rejection of claims 2, 3, 5 and 7 under 35 USC §112 has been removed in light of applicant's amendments;
- e. The prior art rejections for claims 1-7 have been upheld and slightly modified in order to address applicant's amendments.

### ***Claim Objections***

Claim 3 is objected to because of the following informalities: The phrase "...active layers of the anode **an** cathode comprise..." should be changed to "...active layers of the anode **and** cathode comprise...". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1 and 3-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Banerjee et al. (US Pat. No. 5,415,888) (hereinafter "Banerjee").

Regarding claim 1, Banerjee discloses a membrane-electrode assembly comprising: electrodes and an electrolyte membrane, wherein the electrodes include (i) an anode comprising a gas diffusion layer (gas permeable porous layer, see col. 8, lines 27-78) and a catalyst material-containing active layer, and (ii) a cathode comprising a gas diffusion layer and a catalyst material-containing active layer; wherein the active layers of the anode and the cathode are formed on the gas diffusion layers of the anode and cathode, in which a viscosity of the active layers of the anode and cathode is in a range of 100 to 10,00 cPs (1-100 Poises) (see col. 6, lines 7-11); the electrolyte membrane comprises a catalyst material-containing active layer at one or both sides (electrode ink, see col. 4, lines 36-40) and the electrolyte membrane is interposed between the anode and the cathode. Banerjee discloses that the catalytic ink is added to the surface of the electrolyte membrane (see col. 6, lines 48-49). Once the anode and cathode layers (gas permeable porous layers) are hot pressed onto the membrane comprising the catalytic ink, the catalytic ink is also a part of the anode and cathode as well and active layers are formed on both the anode and cathode. Therefore, for the purposes of this rejection, the half of the catalytic ink in contact with the anode or cathode will be considered as the catalyst material-containing active layer of the anode and cathode, while the other half of the catalytic ink in contact with the electrolyte membrane will be considered as the catalyst material-containing active layer of the electrolyte membrane. The final product of the claimed membrane electrode assembly

and the membrane and electrode structure taught by Banerjee are the same, therefore this claim is met.

Claim 3 is a considered a product-by-process claim. The cited prior art teaches all of the positively recited structure of the claimed apparatus or product. The determination of patentability is based upon the apparatus structure itself. The patentability of a product or apparatus does not depend on its method of production or formation. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. See *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (see MPEP § 2113). Barring specification as to the degree of coating, since Banerjee discloses that the electrode layers are formed on the membrane after the catalytic ink on the electrolyte membrane has dried (see col. 9, lines 29-30) the final product would have catalyst particles coated with the electrolyte.

Regarding claim 4, Banerjee discloses the membrane-electrode assembly of Claim 1, wherein the electrolyte membrane further includes an anode-side catalyst material-containing active layer and a cathode-side catalyst material-containing active layer, the anode-side catalyst material-containing active layer includes the same catalyst material as the active layer of the anode, and the cathode-side catalyst material-containing active layer includes the same catalyst material as the active layer of the cathode. As explained above for claim 1, the catalytic ink applied to the electrolyte membrane makes up the active layers of the electrolyte membrane, anode, and cathode. Therefore the catalyst would be the same for all three components.

Claims 5 and 6 are considered product-by-process claims. The cited prior art teaches all of the positively recited structure of the claimed apparatus or product. The determination of patentability is based upon the apparatus structure itself. The patentability of a product or apparatus does not depend on its method of production or formation. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process. See *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985) (see MPEP § 2113). Therefore, the limitation that the active layers of the anode and cathode are formed on the gas diffusion layers of the anode and cathode by a curtain coating process, and the active layer on the electrolyte membrane is formed by a spray coating process are not given patentable weight because the prior art discloses the final product of a membrane electrode assembly comprising a gas diffusion layer and electrolyte membrane with an active layer.

Regarding claim 7, Banerjee discloses the membrane-electrode assembly of Claim 1, wherein the amount of the active layer formed on the electrolyte membrane is 1-100% by weight based on the weight of the active layers of the anode and cathode formed on the gas diffusion layers of the anode and cathode. As explained above in claim 1, the half of the catalytic ink in contact with the anode or cathode will be considered as the catalyst material-containing active layer of the anode and cathode, while the other half of the catalytic ink in contact with the electrolyte membrane will be considered as the catalyst material-containing active layer of the electrolyte membrane. Therefore the amount of the active layer formed on the electrolyte membrane would be

100% by weight based on the weight of the active layer formed on the gas diffusion layer since the catalytic ink is split in half.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Banerjee. Regarding claim 2, Banerjee fails to explicitly disclose the membrane-electrode assembly of Claim 1, wherein the viscosity of the active layer (catalytic ink) in coating the active layer on the gas diffusion layer is in a range of 1,000 to 10,000 cPs (10-100 poises). Banerjee does disclose that the catalytic ink has a viscosity in a range of 1 to 100 poises, especially about 100 poises, and that the viscosity can be controlled by (i) selecting particle sizes, (ii) composition of the catalytically active particles and binder, (iii) a content of water as the medium or (iv) by incorporating a viscosity regulating agent

(see col. 6, lines 7-14). The discovery of an optimum value of a known result effective variable, without producing any new or unexpected results, is within the ambit of a person of ordinary skill in the art. See *In re Boesch*, 205 USPQ 215 (CCPA 1980) (see MPEP § 2144.05, II.). Furthermore, It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985). Therefore it would have been obvious to one of ordinary skill in the art to optimize the range taught by Banerjee to a viscosity between 10 to 100 poises.

### ***Response to Arguments***

Applicant's arguments filed 12/29/09 have been fully considered but they are not persuasive.

Applicant argues:

*"Banerjee does not teach coating catalyst material-containing active layer on either anode or cathode".*

However, claim 1 is a product claims and therefore the prior art does not need to recite the method or steps of forming the final product as long as the structural limitations are met. Therefore, as explained above for claim 1, once the anode and cathode layers (gas permeable porous layers) are hot pressed onto the membrane comprising the catalytic ink, the catalytic ink is also a part of the anode and cathode as

well and active layers are formed on both the anode and cathode. Therefore, for the purposes of this rejection, the half of the catalytic ink in contact with the anode or cathode will be considered as the catalyst material-containing active layer of the anode and cathode, while the other half of the catalytic ink in contact with the electrolyte membrane will be considered as the catalyst material-containing active layer of the electrolyte membrane. The final product of the claimed membrane electrode assembly and the membrane and electrode structure taught by Banerjee are the same, therefore this claim is met.

Examiner would like to note that for claim 2 Applicant only argues that Banerjee does not provide the teaching or suggestion missing from claim 1, but does not argue how Banerjee fails to teach claim 2 as argued above. Therefore, the Examiner maintains the obviousness rejections and upholds the rejection.

It is also noted that "the arguments of counsel cannot take the place of evidence in the record", *In re Schulze*, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965). It is the examiner's position that the arguments provided by the applicant regarding the unexpected results of the membrane-electrode assembly prepared according to claim 1 must be supported by a declaration or affidavit. As set forth in MPEP 716.02(g), "the reason for requiring evidence in a declaration or affidavit form is to obtain the assurances that any statements or representations made are correct, as provided by 35 U.S.C. 24 and 18 U.S.C. 1001".

***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ASHLEY KWON whose telephone number is (571)270-7865. The examiner can normally be reached on Monday to Thursday 7:30 - 6 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.



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